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U1S S1850

(56) Documents Cited
GB 2273338 A GB 2191273 A GB 2092967 A
EP 0121506 A1 WO 91/06461 A1 US 5294149 A

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(54) Adjustable vehicle steering column assembly

(57) An adjustable vehicle steering column assembly includes a steering column 1, an adjustment limiter which includes a first profiled member 2 rigidly joined to the steering column and brackets 3 having windows 3A through which the profiled member passes, and a clamping mechanism which includes friction plates 4 pivotally mounted on the brackets. A rod 6 of the clamping mechanism is coupled to a handle 7 and passes through the profiled member and the friction plates. In an unclamped state, the adjustment limiter allows free movement of the profile member 2 in the adjustment windows 3A, the friction plates (4) being free to rotate about their mounting pivots 5 and translate along the profiled member 2 of the adjustment limiter, thus allowing free movement of the steering column.

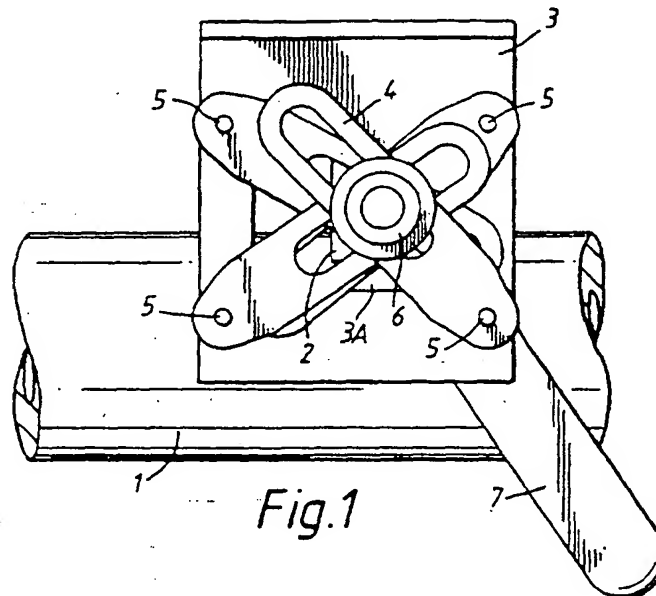


Fig.1

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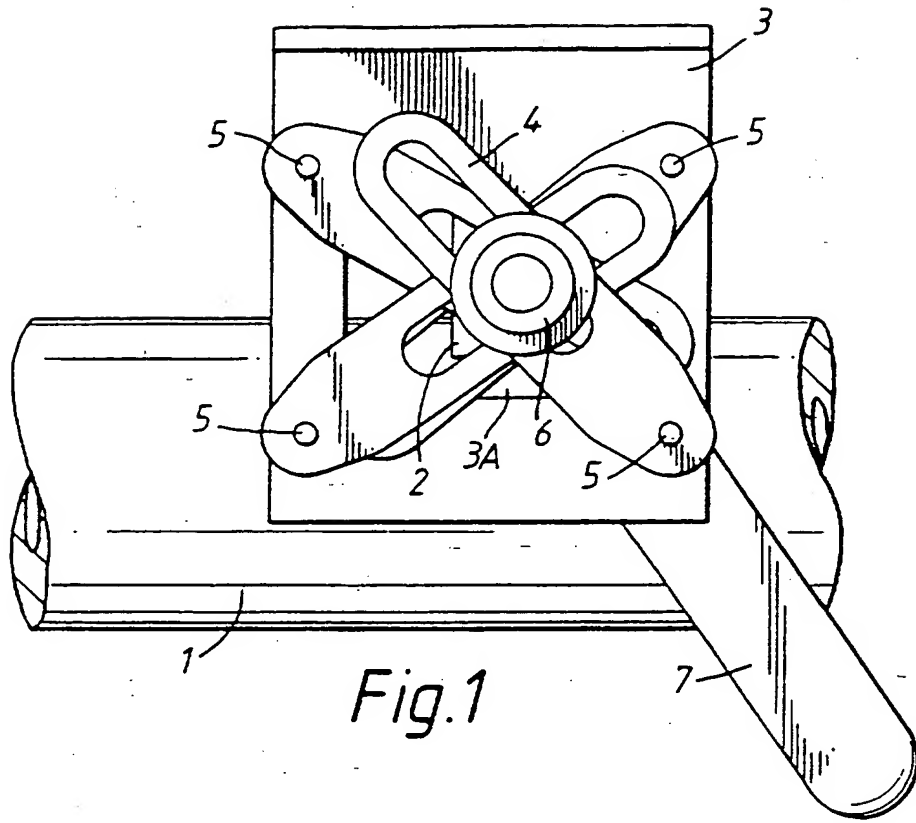


Fig. 1

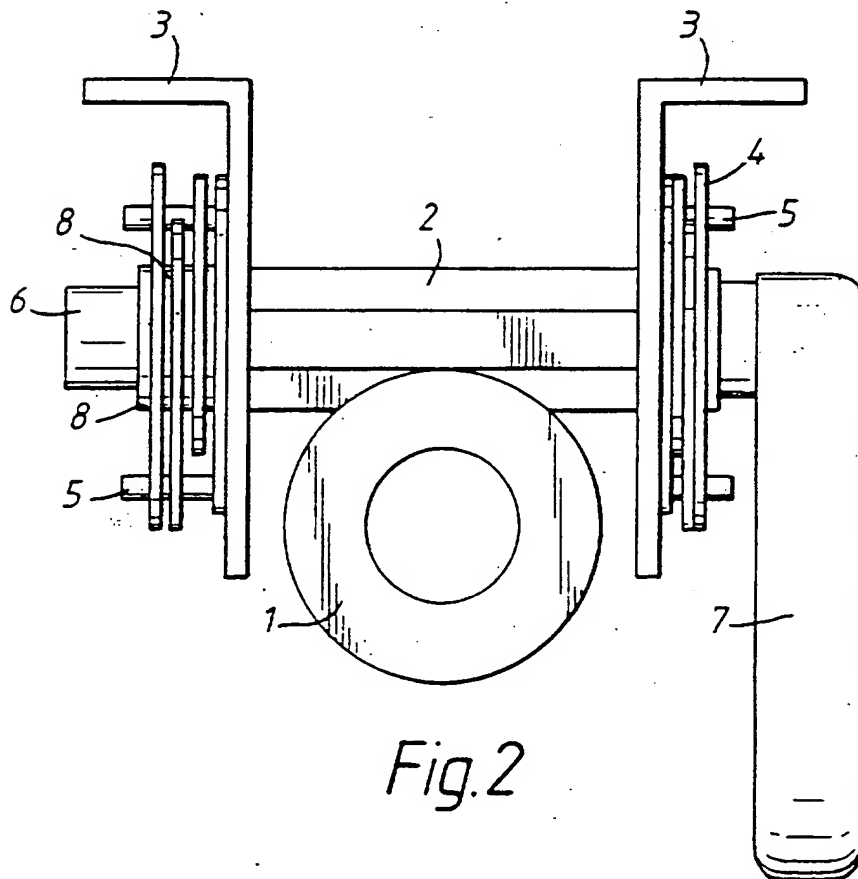


Fig. 2

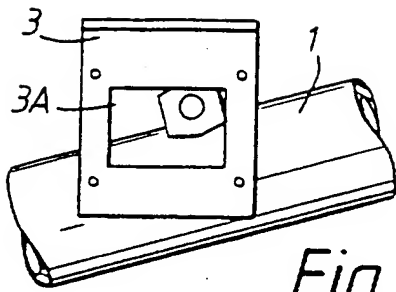


Fig. 3a

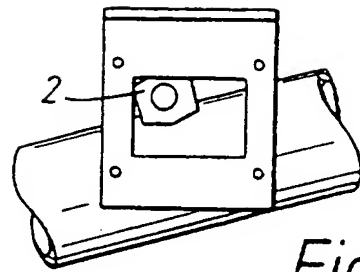


Fig. 3b

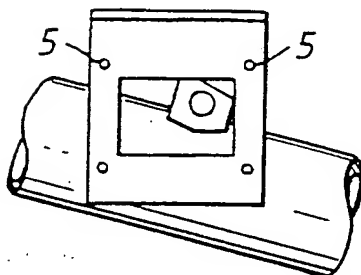


Fig. 3c

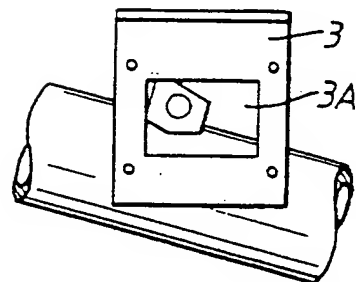


Fig. 3d

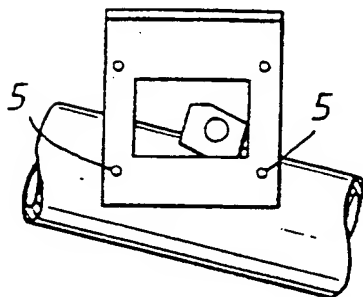


Fig. 3e

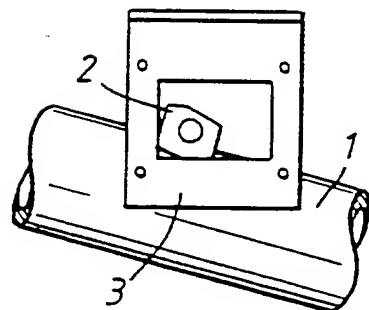


Fig. 3f

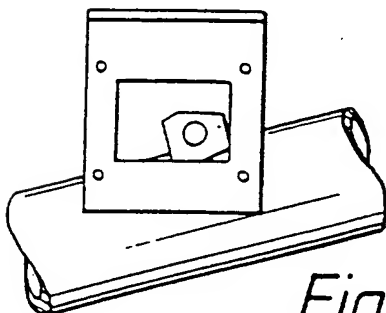


Fig. 3g

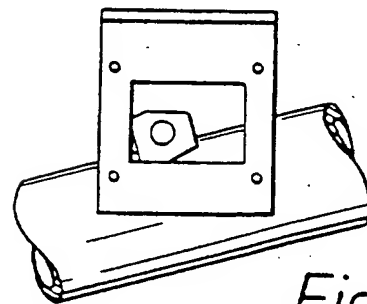


Fig. 3h

ADJUSTABLE VEHICLE STEERING COLUMN ASSEMBLY

This invention relates to an adjustable vehicle steering column assembly.

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Adjustable steering column assemblies are known which include a clamping system to clamp the steering column in the desired adjustment location but there is a perceived need to provide a greater range of adjustment travel, whilst allowing for greater control of the envelope limits within which adjustment is permitted.

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A known mechanism is shown in WO 91/06461.

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According to the present invention, there is provided an adjustable vehicle steering column assembly having a steering column and an adjustment limiter to limit travel of the steering column during adjustment thereof, the adjustment limiter including a first, profiled member, the profiled member being located within a window of a second member of the adjustment limiter, one of said first and second members being joined to part of the steering column and the other of the first and second members being joined to a fixed part of the assembly, the profiled member abutting at least one edge of the window on a limit of adjustment being reached, and there being a clamping mechanism to hold the steering column in the desired adjustment location.

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The first profiled member can be joined to the steering column.

The second member of the adjustment limiter can form part of a support bracket for the steering column. The profiled

member can have a circular profile or can have a polygonal profile.

5 The window of the second member can be substantially rectangular or can have another polygonal shape.

10 In the case where the profiled member is joined to the steering column, the clamping mechanism can pass through the profiled member so that, in an unclamped state of the clamping mechanism, adjustment is permitted and so that in the clamped state of the clamping mechanism, the steering column is held in its desired adjustment location.

15 The clamping mechanism can include a plurality of elongate, slotted friction plates which are each pivotally mounted at one end, the friction plates being arranged to lie across the window of the second member. Another part of the clamping mechanism, being the part that passes through the profiled member, also extends through the slots of the friction members. In the clamped state of the clamping mechanism, the friction plates provide the required clamping force by compression.

20 At least one washer can be provided between one of the friction members and the second member of the adjustment limiter.

30 For a better understanding of the invention and to show how the same may be carried into effect, reference will now be made, by way of example, to the accompanying drawings, in which:-

35 Figure 1 is a diagrammatic side view of an adjustable vehicle steering column assembly having a steering column adjustment limiter,

Figure 2 is a diagrammatic end view of the assembly shown in Figure 1, and

5 Figure 3 shows eight of the possible adjustment limit locations achievable with the present apparatus.

The drawings schematically illustrate an adjustable vehicle steering column assembly including an adjustable steering column 1, which is rigidly joined to a first, profiled member 2 of an adjustment limiter to limit travel of the steering column during adjustment thereof. In the form illustrated, the steering column 1 is adjustable for rake (up/down adjustment) and reach (in/out adjustment) travel.

15 Two steering column support brackets 3 are each provided with a window 3A, which forms a second member of the adjustment limiter.

20 A steering column clamping mechanism includes a set of elongate, slotted, pivotable friction clamping plates 4 (omitted in Figure 3 for clarity), each being mounted on respective pivot pins 5 adjacent one end of each friction plate, respectively.

25 The clamping mechanism further includes a clamping rod 6 passing through the profiled member 2 and the friction plates 4 and coupled to an operating handle 7.

30 By means of a cam lock system or other known device, turning of the handle 7 in a clamping direction causes pressure to be applied to compress the friction plates 4 which lie against the respective faces of the support brackets 3 and it will be seen that this in turn serves to hold the shaft 6 of the clamping mechanism and therefore

the profiled member 2 within the respective windows 3A of the support brackets 3.

5 In the form illustrated, there are four friction plates 4 per support bracket 3 and, in addition, washers 8 are provided between the respective two outermost friction plates 4. (The left-hand side only of Figure 2 shows the assembly with the washers 8 but in practice both sides would be provided with them, or not at all - c.f. the
10 right-hand side of Figure 2).

In summary, therefore, in the unclamped state, the adjustment limiter allows free movement of the profiled member 2 in the adjustment windows 3A in the steering
15 column support brackets 3 and the friction plates 4 are free to rotate about their mounting pivots 5 and translate along the profiled member 2 of the adjustment limiter, thus allowing free movement of the steering column.

20 When the steering column clamping mechanism is in its clamped condition, the friction plates 4 and optional washers 8 are compressed, thereby preventing relative movement between the various parts. This therefore holds the column against rake and reach travel, as well as
25 rotation of the outer steering column.

Depending upon the clamped loads required and the clamp force available from the clamped system, the assembly can be tailored to suit. For example, only two friction plates
30 4 can be provided for each support bracket 3, to as many friction plates as space allows. Coatings can be applied to the friction plates 4 and/or washers 8 to increase clamp friction or decrease unclamped friction as required.

The profile of the profiled member 2 of the adjustment limiter can either be round, or, when special control of the adjustment envelope is required, be a custom shape such as the one illustrated in Figure 3. The adjustment windows 3A in the support brackets 3 can be rectangular or can also be given a custom shape. By altering these shapes, one could, for example, allow less upward rake travel when the column is adjusted closer towards the driver. The effect would be to allow a greater range of movement overall, yet limit it in locations where it affects safety in a crash. Figure 3 shows eight locations of the profiled member 2 within one of the windows 3A to illustrate some of the various possibilities of rake and reach orientation of the steering column 1.

An advantage of the present assembly construction is that a higher clamping force can be achieved for a given torque of the handle 7 and it also allows an increase in the manufacturing tolerances over current assemblies.

The profiled member 2 can be joined to the column 1 by welding, bolting, overcasting or cast as part of the brackets 3, for example. The profiled member 2 should be rigidly mounted relatively to the column 1. If the adjustment limiter is non-symmetrical, then the angular position of the member 2 should also be controlled.

CLAIMS:

1. An adjustable vehicle steering column assembly having a steering column and an adjustment limiter to limit travel
5 of the steering column during adjustment thereof, the adjustment limiter including a first, profiled member, the profiled member being located within a window of a second member of the adjustment limiter, one of said first and second members being joined to part of the steering column
10 and the other of the first and second members being joined to a fixed part of the assembly, the profiled member abutting at least one edge of the window on a limit of adjustment being reached, and there being a clamping mechanism to hold the steering column in the desired
15 adjustment location.
2. An assembly according to claim 1, wherein said first profiled member is joined to the steering column.
- 20 3. An assembly according to claim 1 or 2, wherein the second member of the adjustment limiter forms part of a support bracket for the steering column.
4. An assembly according to claim 1, 2 or 3, wherein said
25 profiled member has a circular profile.
5. An assembly according to claim 1, 2 or 3, wherein said profiled member has a polygonal profile.
- 30 6. An assembly according to any one of the preceding claims, wherein said window of said second member has a polygonal shape.

7. An assembly according to claim 6, wherein said window of said second member is substantially rectangular.

5 8. An assembly according to claim 2 or any one of claims 3 to 7 as appendant to claim 2, wherein said clamping mechanism passes through said profiled member so that, in an unclamped state of the clamping mechanism, adjustment is permitted and so that, in the clamped state of the clamping mechanism, the steering column is held in its desired
10 adjustment location.

9. An assembly according to claim 8, wherein the clamping mechanism includes a plurality of elongate, slotted friction plates which are each pivotally mounted at one
15 end, the friction plates being arranged to lie across the window of said second member.

10. An assembly according to claim 9, wherein the part of the clamping mechanism that passes through the profiled member, also extends through the slots of the friction
20 plates.

11. An assembly according to claim 10, wherein at least one washer is provided between one of the friction plates and the second member of the adjustment limiter.
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12. An adjustable vehicle steering column assembly, substantially as hereinbefore described with reference to the accompanying drawings.
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13. A vehicle including an adjustable vehicle steering column assembly according to any one of the preceding claims.

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Patents Act 1977
Examiner's report to the Comptroller under Section 17
(The Search report)

Application number
 GB 9522131.3

Relevant Technical Fields

- (i) UK Cl (Ed.O) F2Y (YSQ)
 (ii) Int Cl (Ed.6) B62D 1/18

Search Examiner
 PETER SQUIRE

Date of completion of Search
 17 JANUARY 1996

Databases (see below)

(i) UK Patent Office collections of GB, EP, WO and US patent specifications.

Documents considered relevant following a search in respect of Claims :-
 1-13

(ii) ONLINE: EDOC, WPI

Categories of documents

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| <p>X: Document indicating lack of novelty or of inventive step.</p> <p>Y: Document indicating lack of inventive step if combined with one or more other documents of the same category.</p> <p>A: Document indicating technological background and/or state of the art.</p> | <p>P: Document published on or after the declared priority date but before the filing date of the present application.</p> <p>E: Patent document published on or after, but with priority date earlier than, the filing date of the present application.</p> <p>&: Member of the same patent family; corresponding document.</p> |
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Category	Identity of document and relevant passages		Relevant to claim(s)
X	GB 2273338 A	(TORRINGTON) see eg page 4 line 26 to page 5 line 4	1-3, 5-8, 13
X	GB 2191273 A	(DAIMLER BENZ) see eg page 1 line 122 to page 2 line 10	1-4, 6, 7, 13
X	GB 2092967 A	(FORD) see eg page 2 lines 85 to 110	1-4, 6, 8-11, 13
X	EP 0121506 A1	(AFFARSVERKET) see eg page 4 line 22 to page 5 line 10	1-4, 6, 7, 13
X	WO 91/06461 A1	(VOLVO) see eg page 4 line 14 to page 5 line 34	1-4, 6, 13-
X	US 5294149	(NACAM) see eg column 5 lines 12 to 24	1-4, 6, 13

